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DRUGS IN SPORT - ERYTHROPOIETIN

It is not to have taken part but to win at all costs has become the dictum in sport throughout the world.

Unfortunately, to achieve this winning goal, both fair means and foul have been used.

Fair means excellent training methods, proper diet, proper rest, good psychological motivation, etc. *Foul* in most situations means drugs. In order to keep competition fair, drug testing to prevent athletes from using substances which may be helpful, has become the order of the day. Unfortunately the last of banned substances has become as long as your arm.

This has made it both difficult for the athlete as well as his doctor. Well known cough mixtures for example are banned substances. It is therefore important for the "clean" sportsman to go to a doctor who is knowledgeable about these banned substances.

The main problem however, is the sportsman who is taking drugs to enhance performance. There is a war going on between the crooked athletes and the administering doctors.

Whereas most substances are detectable in the urine within a variable time following intake, there are some drugs which because they are natural to the body are impossible to detect as such except that their levels may be abnormal. Testosterone is one of these substances which acts as an anabolic steroid. The anabolic steroids are especially used in strength athletics where anaerobic activity is required. They also play a role in endurance athletics.

In endurance athletes the aim is to get as much oxygen as possible to the involved muscles. This essentially means an increase in red blood cells to carry more oxygen to the rest of the body.

Physiologically this can be done by attitude training, where low oxygen levels in the atmosphere stimulate the production of red blood cells.

Blood doping is a technique which has recently been used. Here the athlete transfuses himself with his own blood stored some time earlier. This is of course "foul play".

More recently (1986) synthetic erythropoietin has been formulated and used by athletes. Erythropoietin is a substance normally produced by the kidneys which is responsible for the formulation of red blood cells.

It is called EPO and is able to raise the haematocrit significantly. It clearly increases the oxygen carrying capacity of the blood. The problem is it is undetectable in the patient and thus escapes routine detection.

The major problem however, is that it causes an increase in blood viscosity which in turn may cause vascular sludging and possible vascular occlusion.

It has been shown to cause an 8% improvement in maximal aerobic capacity, better than the 5% achieved by blood doping. Its effect is also immediate and lasts for 120 days (blood doping 10-15 days).

There is a possibility that EPO has been the reason for the deaths of 18 cyclists from Holland and Belgium since 1987.

It is a frightening thought that with increased availability, the death rate may increase in endurance athletes.

EPO has a very positive role in medicine. It does wonders for the anaemia of renal failure and can cause a significant haematocrit rise in these patients. These people are not in danger of sludging, however, which is the real danger with athletes.

It is produced in California under the trade name EPOGEN and is banned by the International Olympic Committee. It has been used in Europe for the last few years and is apparently available on the black market in the USA. It is undetectable and even so only stays in the body for about 24 hours. It has been called "Go Juice" by those who use it.

The tragedy is that despite negative publicity athletes will still use it in the hope of winning.

It looks like we have another problem on our hands!

Dr Clive Noble MBBChB, FCS (SA)
Editor-in-Chief

OVERVIEW

Recurrent antero lateral subluxation (pivot shift) leads to meniscal tears and stress fractures of the articular surface of the femoral condyles and is often the reason for the sportsman seeking medical advice as it interferes with his sporting ability and leads to a symptomatic painful knee.

Dejour however, believes that it is rather the chronic anterior displacement (Lachman), which is increased by the loss of the medial meniscus, than the antero lateral subluxation (pivot shift) which causes medial compartment osteoarthritis. This means that if the antero lateral subluxation (pivot shift) is eliminated without eliminating the anterior displacement (Lachman) the patient will be able to go back to sport but the progressive medial compartment osteoarthritis will not be halted.

The overload on the posterior aspect of the medial plateau results in a distinct radiological medial compartment osteoarthritis consisting of:

- osteophytes in the inter condylar notch;
- osteophytes on the posterior aspect of the medial tibial plateau;
- narrowing of the medial joint lips;
- posterior subluxation of the medial femoral condyle seen on a lateral standing view.

In treating the ACL deficient knee our aim should be:

1. saving the menisci;
2. eliminating the anterior displacement;
3. eliminating the antero lateral subluxation.

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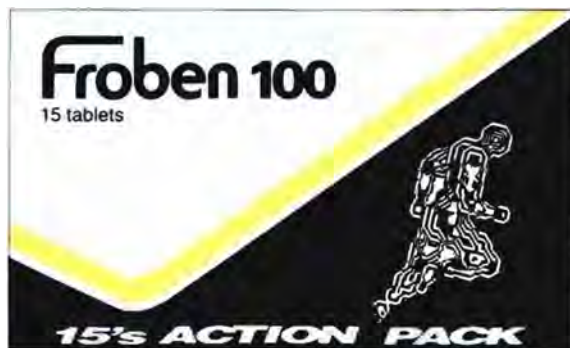


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THE PATIENT AT RISK

Considering what has already been said about the natural history of the ACL deficient knee and the mechanism of medial compartment osteo arthritis it seems that the following patients are especially at risk and should be treated surgically:

- young active sportsmen;

- heavily build patients;
- already established meniscal injury;
- varus deformity - this deformity can either be of bony origin or can be secondary to lateral ligamentous laxity.

WHAT SHOULD BE RECONSTRUCTED?

It is clear that both the pivot shift and the Lachman signs should be eliminated by surgery if we wish to obtain a longterm satisfactory result.

Jakob (JBJS Vol 69B No 1 - 1987, pg 294-299) suggests grading the pivot shift, and this can be used as a guide to which surgical procedure should be performed. (See Table 1).

I would not suggest a specific procedure for repairing this instability but I am just mentioning a few of the more common procedures.

Lateral Extra Articular

Ilio tibial bank (McIntosh/Lemaire/Andrews/Muller) can be used or possibly biceps tendon.

Table 1

Grade 1:	pivot shift + int rotation - neutral - ext rotation lachman < 9 mm] lateral extra articular repair
Grade 2:	pivot shift + int rotation + neutral - ext rotation lachman 10-15 mm	
Grade 3:	pivot shift + ant rotation + neutral + ext rotation lachman > 15 mm] lateral extra articular repair central repair medial extra articular repair

Table 2

Tissues Available	Strength(N)	Width(mm)
Anterior Cruciate Ligament	1725 ± 269	N.A.
Bone-Patellar Tendon-Bone		
Central 1/3	2900 ± 260	13,8 ± 1,4
Medial 1/3	2734 ± 298	14,9 ± 1,1
Semitendonsus	1216 ± 50	
Fascia Lata (15 mm)	628 ± 35	15,6 ± 0,8
Fascia Lata (45 mm)	1800	
Gracilis	838 ± 30	
Quadriceps-patellar retinaculum-patellar tendon, central	266 ± 74	16,3 ± 3,5
Meniscus	less commonly used	

The following are the normal loads in daily activities:

Activity	Maximum Force (N)	Activity	Maximum Force (N)
Level walking	210	Ascending Ramp	107
Ascending stairs	67	Descending Ramp	485
Descending stairs	133	Jogging	630
Sitting and Rising	173	Jolting	700

OVERVIEW

Must not use a technique that will in any way compromise the lateral stabilising structures as that will increase the load on the medial compartment.

Intra Articular

Autogenous

Table 2 indicates tissue available for autogenous grafts and with their strength in Newtons are given. This is data from Noyes *et al.* It should be noted that they do not state what part of the fascia lata was tested, the distal part of the fascia lata is much stronger than the proximal part and it would be important to know which part they tested to make a reasonable assessment on the use of fascia lata or otherwise.

It seems that only the patellar tendon (Jones/ Erikson/ Clancy) and the semitendinosus is of adequate strength. A wide strip of ilio tibial band or fascia lata might be strong enough but as it compromises the lateral stabilising structures, it should probably only be used in rare cases.

It should be noted that autografts are free grafts which undergo necrosis, vascular invasion and cellular proliferation. There is bone to bone healing in cases where bone-patellar tendon-bone grafts are used.

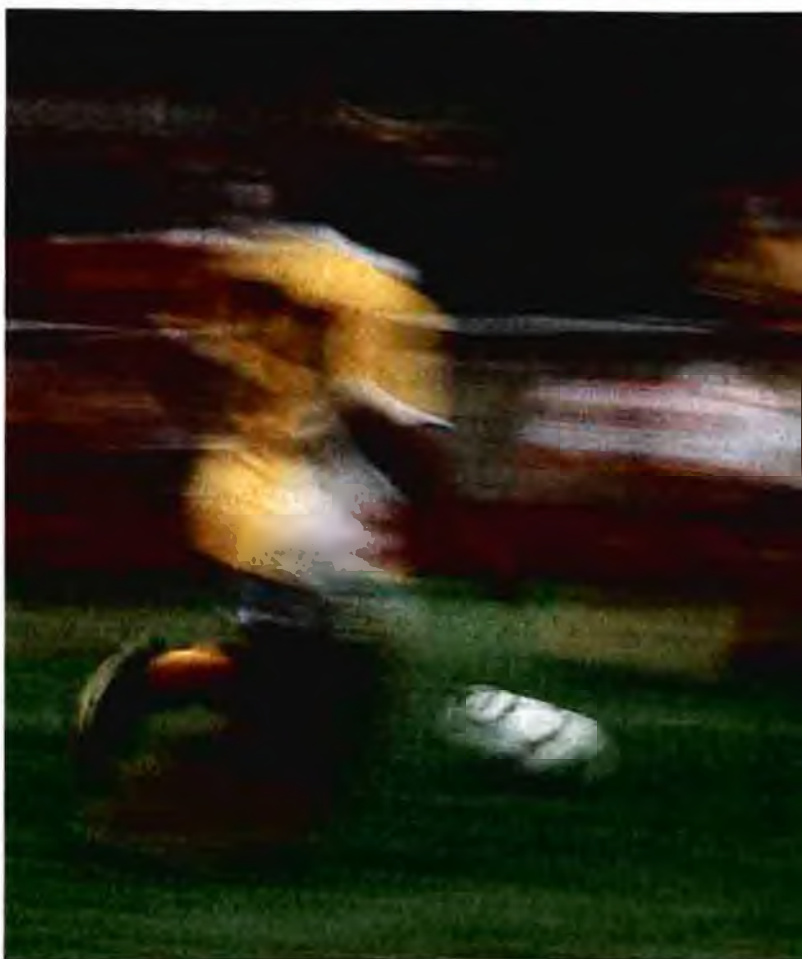
Homogenous (Allografts)

At the moment there is a great interest in this tissue, and the following is a basic summary of the present situation.

The following tissue can be used:

- bone/patellar tendon/bone
- fascia lata
- achilles tendon

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Stringent donor criteria is necessary to avoid disease transmission such as Aids, Hepatitis, etc.

Grafts can be harvested *clean* which then need sterilisation by either:

- ethylene oxide which tends to cause a synovitis in the joint; or
- irradiation, which causes a decrease in the strength.

When fresh frozen and then irradiated (2Mrad) there is a 25% loss of strength. When freeze-dried and irradiated there is a 75% loss of strength.

Grafts can also be harvested *sterile* which do not need any further treatment.

Preservation can either be done by deep freezing (below -70° C) or by freeze-drying.

No rejection of allografts has been reported and they seem to heal and incorporate in the same way as autografts.

It seems that if it is possible to obtain tissue that has met with stringent donor criteria and has been harvested *sterily* and deep frozen, it might be the tissue of choice to use. On the other hand if the tissue available has been gassed, irradiated or freeze-dried it seems to be of inferior quality and should not be used.

Heterogenous/Prosthetic materials

The problems with prosthetic ligaments as well as augmentation devices can be summarised as follows:

- weak ingrowth of biological tissue in areas of fixation;
- release of worn particles leading to tissue reaction both intra articularly and in areas of fixation; and
- fatigue and failure with long-term use.

As a result of these mentioned problems the present indication for prosthetic ligaments are only in salvage surgery.

As regards augmentation devices there is no conclusive proof that they in fact give superior results to autogenous grafts used without any augmentation and cases have been described where debris from these devices has resulted in intra as well as extra articular tissue reactions.

The following few articles make interesting reading:

1. Poly propoline LAD - Roth *AJSM* 16, 3, pg 301-305, 1985.
2. Poli ethylene - Edwald *CORR* 115, pg 213-219, 1976.
3. Carbon fibre - Parsons *CORR* 196, pg 71-76, 1985.
4. Prosthetic Synovitis - Kaufman *J Rheum* 12, pg 1066-1074, 1985.
5. Arthritis in artificial ligaments - Kline *AJSM* 17: 717, 1989.

Medial Extra Articular

Reefing postero medial capsule (Houston) or an advancement semi membranous tendon (Trillat), this seems to be preferable as it is not influenced by the isometric points, which are very difficult to determine on the medial side.

OPERATIVE REQUISITES

Having decided who should be treated and what should be repaired there are certain technical requirements which must be met for a successful reconstruction.

Proper graft selection

Strength

The graft should be at least as strong or stronger than the ACL. From the work of Noyes it seems that of the autogenous tissue it is only the patellar tendon, a doubled semitendinosus and a wide strip of fascia lata that can be used for ACL reconstruction.

Joint acceptability

This is especially important when using prosthetic ligaments or homogenous, heterogenous grafts. Cases of reactive synovitis to these types

OVERVIEW

of ligaments have been described and it is possible that, in the future, we will see more of this problem.

Longterm survival

It is important that the reconstructed ligament should have a reasonable functional survival period.

Isometric placement

Definition of isometry

A graft is isometric if it is so positioned that it maintains constant length and tension throughout passive knee motion.

Intra Articular

(Odenstein *JBS* 67A, pg 257-262, 1985)

Femur: 15 mm (\pm 3) anterior from over the top.

Tibia: 23 mm (\pm 4) posterior from the menisco capsular junction

Angle: with the knee flexed 90° the angle between the femoral shaft and ACL is 28 (\pm 4).

It seems from the most recent work of Henning and Muller that the anterior edge of the ACL represents the isometric points. Anterior from this on the tibia results in tightness in extension and posterior in tightness in flexion.

Anterior from this in the femur results in tightness in flexion and posterior in tightness in extension.

Extra Articular

(Krackow *AJSM* 11, 5, pg 293-302, 1983)

Lateral

Femur: best position is just proximal and posterior from the origin of the lateral ligament on the lateral femoral condyle.

Tibia: best position specifically in combination with the mentioned femoral sight, is just anterior from Gurdey's tubercle.

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Medial

To my knowledge no specific work has been done on the isometric points on the medial side of the tibia/femur. We however, know that they would lie on Burmester's Curve and has been well described in Muller's book on the knee. (*"The Knee Form, Function, Ligament Reconstruction"* - Springer Verlag 1983).

In practice this means that a graft should be so positioned that after placement, the knee should be able to move passively through a full range of movement without undue laxity or tensioning developing in the graft. The best way to attain this is to test the isometry of the proposed point of implantation of the graft before finally fixing it and then once it has been fixed to again check for tensioning and full range of movement.

Fixation

Fixation should be of such a nature that immediate guarded post operative mobilisation is possible. It seems that fixation to a bony point is preferable to ligamentous fixation. The ideal is a bone to bone fixation as is achieved with patellar tendon grafts. Non absorbable materials should be used and there should be no undue compression of the ligamentous parts of the graft as this will lead to pressure necrosis and rupture of the graft.

At present it seems that the best way of fixating bone-tendon-bone grafts is by the so-called interference screw method as has originally been described by Lambert, or by interface fixation where the bony part of the graft is bigger than the hole in which it is fixated. In tendon grafts it seems that the best fixation is obtained by using unabsorbable sutures and a so-called "whip" stitch. This can be tied either through bone holes or over a screw or staple.

Tensioning

Correct tensioning is important to prevent lax grafts which will lead to instability or tight grafts which will either rupture or lead to a permanent joint contracture. A tensiometer is of use but even more practical is to put the joint through a full range of motion after the graft has

been fixed and at the same time to test the stability.

Minimal Iatrogenic joint damage

The more surgical damage done to the joint and the ligamentous structures the more post operative swelling, scarring and osteo arthritis will result. Using the arthroscope, meticulous tissue plane dissection, meticulous tissue re-apposition and hemosthesis all contribute to lessening the surgical damage.

POST OPERATIVE REQUISITES

Early mobilization decreases disuse effect, lessens capsular contractures, maintains articular cartilage nutrition and allows early controlled forces on the graft which has a positive effect on collagen healing. It is clear that wherever possible, one should strive to start mobilising the joint as soon as possible. In studies O'Brien, Wong and Friedrich came to the following conclusion: "Immediate full active motion, quadriceps and hamstring exercises may produce insignificant and safe loads on an isometric ACL reconstruction". To achieve this one has to fulfil the already mentioned criteria of:

- proper graft selection;
- isometric placement;
- adequate internal fixation; and
- correct tensioning.

REHABILITATION PROGRAMME

It is essential to have a carefully planned post operative rehabilitation programme. It should be started immediately post operatively and be continued over an approximate 9 month period. There should be good liaison between the surgeon, physiotherapist and biokineticist. □

THE ACHILLES TENDON: A PILOT STUDY TO INVESTIGATE THE RELATIONSHIP BETWEEN CALF SIZE AND STRENGTH AND ACHILLES TENDON THICKNESS

J Mitchell, J Bowles, N Green and D Wolff

ABSTRACT

In order to establish normal data for calf size and strength and Achilles tendon thickness, 19 young, healthy and physically active males, aged between 18 and 25 years, and with a mean body mass of $75,2 \pm 6,1$ kg and a mean height of $1,81 \pm 0,04$ m, were selected as subjects for this study. Calf size was found to be $36,9 \pm 2,0$ cms (mean \pm standard deviation), and calf strength 43 ± 14 kg for 10RM and 67 ± 20 kg for 1RM. Achilles tendon thickness was $2,53 \pm 0,30$ cms (mean \pm standard deviation) at the calcaneal insertion, $1,87 \pm 0,21$ cms at 4 cms above the calcaneus and $2,79 \pm 0,33$ cms at the musculo-tendinous junction. The Achilles tendon thickness at the calcaneal insertion was significantly smaller than at the musculo-tendinous junction ($t = 2,58$; $p < 0,01$) and greater than at 4 cms above the calcaneus ($t = 5,42$; $p < 0,001$). There was a significant correlation between calf size and strength ($r = 0,66$), but no significant correlation between calf size and Achilles tendon thickness, or between calf strength and Achilles tendon thickness. It is suggested that a large, strong calf and a thin Achilles tendon may be predisposing factors for Achilles tendon rupture.

INTRODUCTION

There has been an increase in the incidence of rupture of the Achilles tendon in recent years, which may be associated with the increasing emphasis on sport.^{1,2} It has been reported that 83,3% of cases of Achilles tendon rupture¹ occur at the intermediate part of the tendon (three to five centimetres¹ or two to six centimetres³ above the calcaneus), which suggests that this part of the tendon is

the narrowest and therefore the weakest part. Furthermore, it seems likely that if an individual has a large calf or a strong calf, and a thin Achilles tendon, rupture at the narrowest part of the tendon could occur.

No normal values for calf size and strength and for Achilles tendon thickness are reported in the current literature. Therefore, this study was designed to establish some normal data and to determine whether there is a relationship

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between size and strength of the calf and Achilles tendon thickness.

MATERIALS AND METHODS

Sample

Questionnaires were distributed to second-year male medical students at the University of the Witwatersrand to select appropriate subjects. From this population, 50 male students were found to be suitable in that they had no history of any ankle injuries, particularly Achilles tendon rupture or tendinitis, and were physically active. Nineteen of these students consented to the measurement procedure. The final sample thus consisted of 19 young, healthy, active males between the ages of 18 and 25 years, with an average height of $1,81 \pm 0,04$ metres (N = 17) and an average body mass of $75,2 \pm 6,1$ kilograms (N = 17).

METHODS OF MEASUREMENT

Calf size

Calf circumference was taken as a measure of calf size. Each calf of each subject was measured while the subject was seated, with the hip, knee and ankle joints at an angle of approximately 90 degrees. The broadest circumference of the calf was measured using a standard measuring tape, calibrated in centimetres.

Calf strength

Each calf was measured for

strength using a standard gymnasium straight-leg-calf-induced-heel-raising-resistance apparatus (calf-raising machine). Measurements were made on each subject in the standing position, with one leg then the other leg straight and weight-bearing, so that each calf was measured separately. A warm-up exercise of 10 sub-maximal heel-raises followed by a one-minute calf-stretch was given before the tests. A rest period of two minutes was allowed between the tests. The testing procedure involved, firstly, the 10RM (ten repetition maximum or the greatest weight that can be lifted ten times at a normal speed without fatigue or discomfort) being measured for each calf. Secondly, the 1RM (one repetition maximum or the greatest weight that can be lifted once at

a normal speed without discomfort or fatigue) was measured for each calf.

Achilles tendon thickness

The Achilles tendon thickness was measured at three points:

- at the insertion of the tendon into the calcaneus (TA₁);
- at a point four centimetres above the calcaneus (TA₂);
- at the musculo-tendinous junction (TA₃).

Vernier callipers, calibrated in millimetres, were used, and the subject was seated with the hip, knee and ankle joints at an angle of approximately 90 degrees, the feet supported on a stool.

Table 1: Mean values of variables (mean ± standard deviation: N = 19)

Variables	Left leg	Right leg	Both legs	p
CS	36,8 ± 2,0 cms	36,9 ± 2,0 cms	36,9 ± 2,0 cms	NS
10RM	43 ± 14 kg	43 ± 14 kg	43 ± 14 kg	NS
1RM	67 ± 20 kg	67 ± 20 kg	67 ± 20 kg	NS
TA ₁	2,54 ± 0,30 cms	2,53 ± 0,33 cms	2,53 ± 0,30 cms	NS
TA ₂	1,87 ± 0,27 cms	1,88 ± 0,18 cms	1,87 ± 0,21 cms	NS
TA ₃	2,80 ± 0,31 cms	2,78 ± 0,38 cms	2,79 ± 0,33 cms	NS

- CS = Calf size
- NS = Non-significant
- RM = Repetition maximum (calf strength)
- TA₁ = Achilles tendon thickness at calcaneal insertion
- TA₂ = Achilles tendon thickness at point 4cm above calcaneus
- TA₃ = Achilles tendon thickness at musculo-tendinous junction

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Table 2: Tests for significance (t - tests; N = 19)

Variables	t	p
10RM/1RM	4,09	<0,001
CS/TA ₁	70,40	<0,001
CS/TA ₂	69,69	<0,001
CS/TA ₃	68,00	<0,001
TA ₁ /TA ₂	5,42	<0,001
TA ₁ /TA ₃	2,58	<0,001
TA ₂ /TA ₃	5,70	<0,001

CS = Calf size
 NS = Non-significant
 RM = Repetition maximum (calf strength)
 TA₁ = Achilles tendon thickness at calcaneal insertion
 TA₂ = Achilles tendon thickness at point 4cm above calcaneus
 TA₃ = Achilles tendon thickness at musculo-tendinous junction

All measurements were made by the same researchers, to eliminate any inter-rater variance.

RESULTS

Difference between legs

On statistical analysis of the data, it was found that there was no significant difference between the left and the right legs for any of the measurements (Table 1).

Calf size and strength and Achilles tendon thickness

Table 1 shows the mean values for calf size and strength (10RM and 1RM) and for the Achilles tendon thickness at the three points of measurement (the calcaneal insertion; 4 cms

above the calcaneus, and the musculo-tendinous junction), for the left leg, the right leg and both legs.

As expected, the 1RM calf strength was significantly greater than the 10RM strength (Table 2). Table 2 shows too that the thickness of the Achilles tendon varies significantly along its length. At the calcaneal insertion, the Achilles tendon is thicker than at its intermediate part and thinner than at the musculo-tendinous junction. At the musculo-tendinous junction, the Achilles tendon is thicker than at its intermediate part (Table 1).

Correlations between calf size, strength and Achilles tendon thickness

Table 3 shows that there is a good correlation between the size and strength of the calf for both the 10RM and the 1RM. However, Table 3 shows too that there is no significant correlation between calf size and Achilles tendon thickness at the calcaneal insertion, at the musculo-tendinous junction and at the point 4 cms above the calcaneus. There is also no significant correlation between calf strength and the Achilles tendon thickness at the calcaneal insertion; at the musculo-tendinous junction, or at the intermediate part of the Achilles tendon (Table 3). Table 3 shows too that although there is a significant correlation between the Achilles tendon thicknesses at the calcaneus and the musculo-tendinous junction, there is no such correlation between either of these measurements and that at the intermediate part of the

Table 3: Tests for correlation (Pearson's correlation (r); N = 19)

Variables	r	r ²	p
CS/10RM	0,66	0,44	<0,01
CS/1RM	0,66	0,44	<0,01
CS/TA ₁	0,30	0,09	NS
CS/TA ₂	0,30	0,09	NS
CS/TA ₃	0,37	0,14	NS
10RM/TA ₁	0,14	0,02	NS
10RM/TA ₂	0,24	0,06	NS
10RM/TA ₃	-0,23	0,05	NS
1RM/TA ₁	0,21	0,04	NS
1RM/TA ₂	0,30	0,09	NS
1RM/TA ₃	-0,17	0,03	NS
TA1/TA ₂	0,16	0,03	NS
TA1/TA ₃	0,55	0,30	<0,05
TA2/TA ₃	0,16	0,03	NS
Body Mass	0,76	0,58	<0,001
Body Mass/10RM	0,79	0,62	<0,001
Body Mass/1RM	0,66	0,44	<0,01

CS = Calf size
 NS = Non-significant
 RM = Repetition maximum (calf strength)
 TA₁ = Achilles tendon thickness at calcaneal insertion
 TA₂ = Achilles tendon thickness at point 4 cm above calcaneus
 TA₃ = Achilles tendon thickness at musculo-tendinous junction

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tendon. A significant correlation exists between body mass and calf size and strength (Table 3), but no such correlation was shown between height and these variables.

DISCUSSION

It is reasonable to suppose that the Achilles tendon thickness is related to calf size and strength, and that these variables are related to an individual's height and body mass. Furthermore, physiological hypertrophy of the calf muscles in proportion to physiological needs should produce an increase in the strength of the calf muscles and hypertrophy of their tendon.

The data from this study confirm that the first of these suppositions is correct. Calf size and strength are significantly correlated and are correlated, in turn, with body mass. However, no significant correlation was found between calf size or strength and height. This correlation with body mass is weak, however, with changes in body mass explaining only approximately 50% of the change in calf size and strength. Therefore, other factors such as non-physiological exercise, for example, must contribute to the variance in calf size and strength.

More importantly, the data from this study show that calf size and strength are not associated with changes in Achilles tendon thickness. Moreover, the thickness of the Achilles tendon varies along its length, with the intermediate part being the thinnest. These results show that it is possible for an individual to

develop a large, strong calf without developing an appropriately thick Achilles tendon. This combination of a strong calf and a thin Achilles tendon could result, therefore, in a rupture of the Achilles tendon, at its thinnest, intermediate part, especially if the tendon is placed under abnormal tension.

CONCLUSIONS

This study has shown that height and body mass do not explain all the changes in calf size and strength. Similarly, a significant relationship between calf size and strength and Achilles tendon thickness does not exist in the normal, healthy, physically active young male. Furthermore, the thickness of the Achilles tendon varies. Therefore, the presence of a thin Achilles tendon and a strong calf muscle may be considered as a predictive factor of Achilles tendon rupture, and such trauma is most likely to occur at the thinnest, intermediate part of the tendon.

ACKNOWLEDGEMENTS

This study was approved by the Committee for Research on Human Subjects (Protocol No. 12/2/90).

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Ⓢ V/3.1/62, V/3.1/238
W.F.I. H/34/128

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Components:
TENOXICAM 20 mg

Indications:

Symptomatic treatment of the following painful inflammatory and degenerative disorders of the musculoskeletal system: rheumatoid arthritis; osteoarthritis; ankylosing spondylitis; extra-articular disorders, e.g. tendinitis, bursitis, periarthritis, gouty arthritis (for tablets).

Dosage:

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Contra-indications:

Known hypersensitivity to the drug. Patients in whom salicylates or other nonsteroidal anti-inflammatory drugs (NSAIDs) induce symptoms of asthma, rhinitis or urticaria. Patients who are suffering or have suffered from severe diseases of the upper gastrointestinal tract, including gastritis, gastric and duodenal ulcer. Before anaesthesia or surgery, 'TILCOTIL' should not be given to patients at risk of kidney failure, or to patients with increased risk of bleeding. Concurrent treatment with salicylates or other NSAIDs should be avoided. Pregnancy and lactation.

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Simultaneous treatment with anticoagulants and/or oral antidiabetics should be avoided unless the patient can be closely monitored. Renal function (BUN, creatinine, development of oedema, weight gain, etc.) should be monitored, when giving a NSAID to the elderly or to patients with conditions that could increase their risk of developing renal failure.

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NOTES ON THE PHYSIOLOGY OF MUSCLE CONTRACTION

M Frescura

Muscle can be categorised into three types: skeletal (sometimes known as striated muscle on account of its striated appearance under the light microscope), cardiac and smooth. In this series of articles, we will be addressing the fundamental question of how a muscle contracts with reference to skeletal muscle only. We shall commence with an outline of some of the gross mechanical properties of this type of muscle and then, in order to understand the physiological basis of muscle contraction we shall progress to a description of events at the cellular level.

Skeletal muscle makes up the great mass of somatic musculature. Characteristically, it contracts and fatigues rapidly, does not normally contract without nervous stimulation and is generally under voluntary control. When an individual chooses to flex a

muscle, an electrical signal is transmitted from the brain to the muscle via the nervous system. The membrane surrounding individual muscle cells has electrical properties such that a potential difference exists across this membrane of magnitude about -90 mV at rest. The potential difference is maintained by a characteristic distribution of ions. When the electrical signal or nerve impulse arrives at the muscle membrane, there is a transitory reversal of potential which is the cue for the mechanical event of muscle contraction. Although the mechanical event does not normally occur without the preceding electrical event, the two are physiologically distinguished. The manner in which mechanical contraction is coupled to electrical stimulation is a very involved subject, best dealt with as a separate issue. For the moment, let's consider some of the mechanical properties of muscle that have been investigated by physiologists.

muscle, the muscle responds with a quick sharp contraction or twitch (Figure 1A). If electrical stimulation is administered in the form of two shocks in succession, two twitches occur. However, if the time interval between twitches is gradually shortened, the twitches begin to fuse or summate (Figure 1B). The summated response from two shocks delivered in quick succession gives rise to a smooth contraction of larger and longer duration than that of a single twitch (Figure 1C). Going a step further, if a series of shocks of sufficiently high frequency is delivered, the muscle will maintain its contraction which is technically known as a tetanus (Figure 1D-F). A lower frequency of stimulation allows the individual twitches to be distinguished (Figure 1D). Now in the human body, muscles normally contract tetanically, i.e. are stimulated by a train of electric shocks (impulses) from the nervous system delivered at a frequency of about 15 to 30 shocks per second. The contraction lasts just as long as the train of electrical impulses are fired and that depends on you. By a voluntary decision in the brain to

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CONTRACTION

Physiologists know that if a sufficiently strong single electrical shock is administered to a

Figure 1: Representation of tracings obtained from stimulating a skeletal muscle. Time scale of electrical stimuli shown along horizontal axis. Intensity of muscle contraction shown along vertical axis.

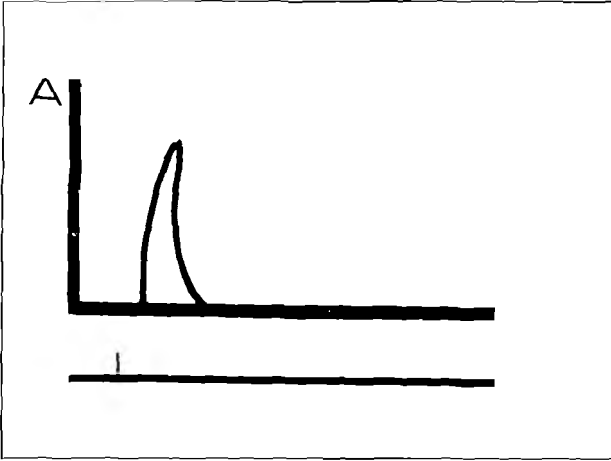


Figure 1A: A twitch response from a single stimulus.

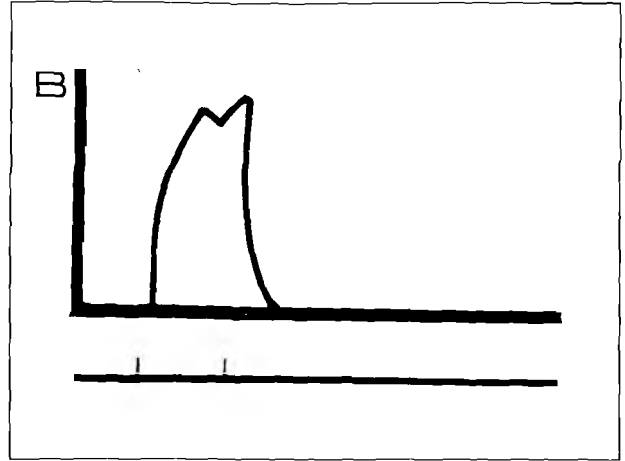


Figure 1B: The response from two stimuli in succession.

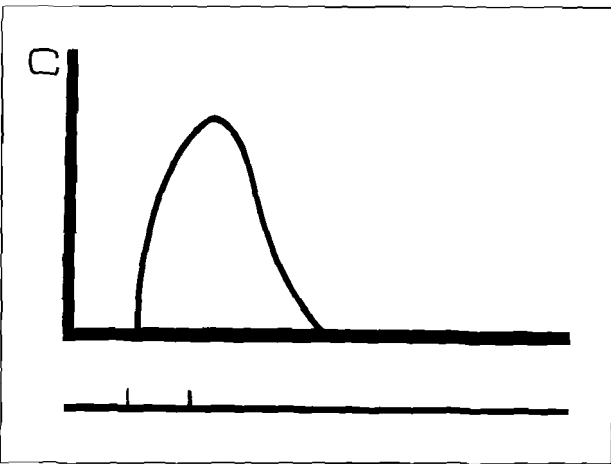


Figure 1C: As for B but with a shorter interval between stimuli showing fusion of response (summation).

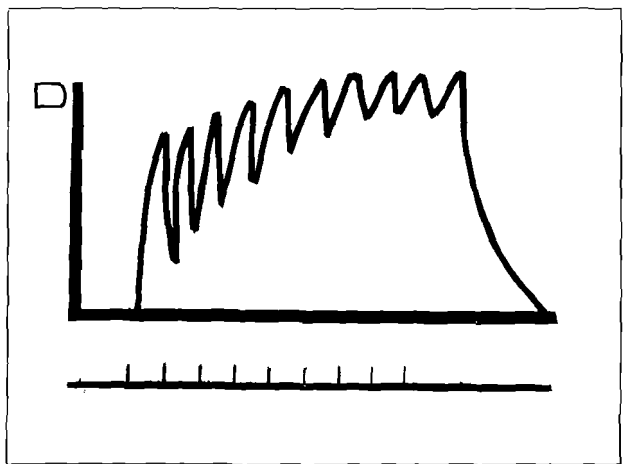


Figure 1D: Response from a train of electrical stimuli.

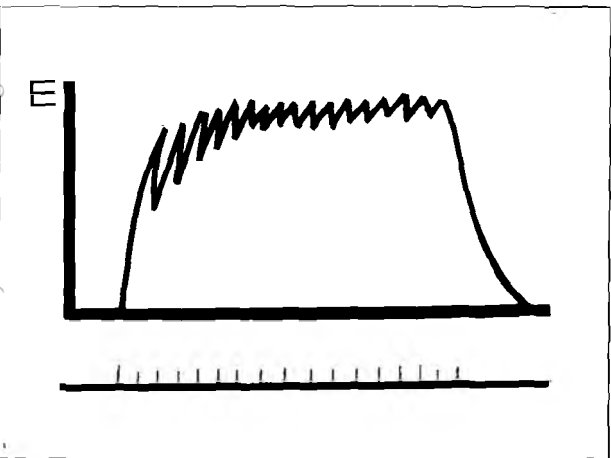


Figure 1E: As for D but with shorter intervals between stimuli showing a sustained contraction.

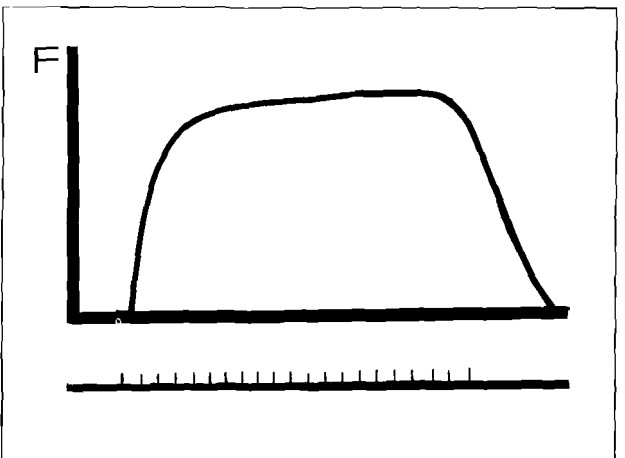


Figure 1F: As for E but with a shorter interval between stimuli leading to a smooth tetanus.

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Figure 2: Diagrams to illustrate motor units within each of two muscles.

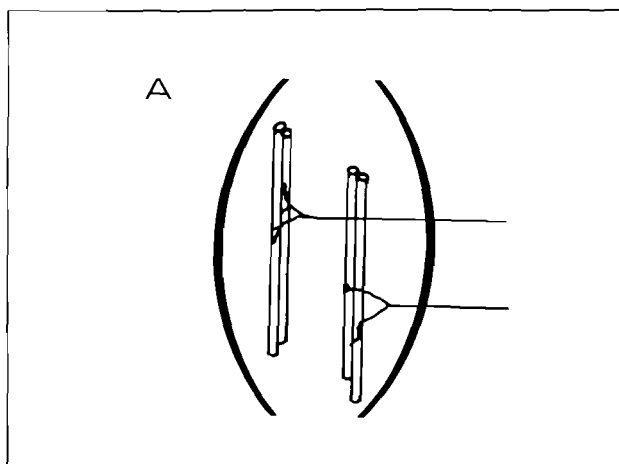


Figure 2A: Each motor unit consists of a motor neuron and two muscle fibres.

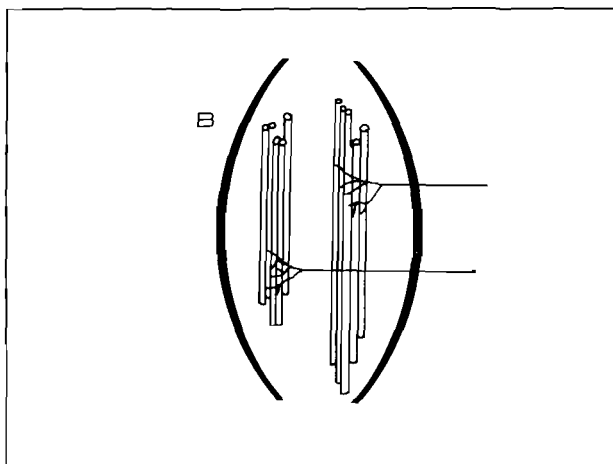


Figure 2B: Each motor unit consists of a motor neuron and five muscle fibres. In reality, the number of fibres associated with each motor unit would be larger but is reduced in the diagram for simplicity.

stop the muscle contracting, the train of electrical impulses is "switched off".

"switch off" the train of electrical impulses.

FATIGUE

What happens if the train of electrical shocks inducing a contraction persists? A tetanic contraction cannot go on indefinitely and if stimulation continues for long periods, the muscular response declines and eventually disappears altogether. The muscle becomes fatigued.

There are several factors that bring this about, one of which is exhaustion of energy reserves within the muscle. This leads to a build up of lactic acid which is toxic to the muscle tissue. Fortunately, we experience this in terms of pain in our muscles after prolonged muscle exercise and so our brain tells us to "stop" contracting the muscle, i.e.

CONTROL OF TOTAL MUSCLE TENSION AND FATIGUE

The greater the frequency of stimulation the greater the intensity of the mechanical response until a frequency is reached beyond which the response no longer increases (Figure 1F). This is the greatest tension the muscle can develop. The total tension a muscle can develop depends upon two factors:

- the amount of tension developed by each contracting fibre in a muscle; and
- the number of muscle fibres stimulated in the contracting muscle at any given time.

The first of these factors depends on the frequency with which each fibre is stimulated, leading to summation and tetanus. It also depends on some aspects of the structure and dimensions of the components of a muscle fibre which we will consider at a later date.

The second of these factors can also vary in two ways depending on the number of motor neurons activated and the number of muscle fibres associated with each of them. Look at Figure 2A and B. A single motor neuron stimulates a specific number of muscle fibres. This arrangement, namely, a motor neuron and the fibres it innervates, is called a motor unit which may be small or large depending on the number of fibres associated with the neuron (two and five respectively in Figures 1A and 1B). A muscle is composed of many such units. As the num-

ber of motor units receiving electrical stimulation goes up, so does the intensity of the contraction. In addition, the number of muscle fibres associated with a single motor unit varies considerably in different types of muscle. In muscles such as those of the hand and eye, which are able to produce very delicate movements, the size of the individual motor units is small (in an eye muscle, one motor neuron innervates about ten muscle fibres only). By contrast, in the more coarsely controlled muscles of the back and legs, each motor unit contains hundreds of muscle fibres (a single motor unit in the large gastrocnemius calf muscle

contains closer to one thousand seven hundred muscle fibres). If a muscle fibre is composed of small motor units, the total tension produced by the muscle can be increased in small steps by the recruitment of additional motor units, whereas if the motor units are large, a greater jump in tension occurs as each additional motor unit is recruited. Muscles with small motor units then, allow finer control of muscle tension. And the total tension a muscle develops can vary according to the number of fibres associated with each motor unit.

An interesting way of overcoming the fatigue that might result from prolonged continu-

ous activity in some muscles is for motor neurons to fire synchronously. Thus, some motor units may be active while other motor units are momentarily inactive or, if you like, resting. In muscles which are active for long periods of time, e.g. postural muscles which support the weight of the body, this synchronous activity helps prevent fatigue while maintaining an almost constant tension.

In the next article we shall look at the ultrastructure and explore some of the events involved in muscle contraction at the level of an individual muscle fibre. □

A P P L I C A T I O N F O R RESEARCH GRANT

To promote knowledge about the role of sugar in health and nutrition, the South African Sugar Association looks to the scientific community for reliable and up-to-date information. As part of this process, it supports scientific research projects designed to clarify issues which arise in this public terrain. The Sugar Association acts on the recommendations of a Research Advisor and Advisory Panel.

Priorities for research funding by the Association are:

1. Physical work, exercise or sport in relation to diet.
2. Obesity and the comparative role of different dietary factors and forms of exercise.
3. Causes of dental caries and periodontal disease.
4. Diet in relation to diabetes mellitus.
5. Hyperlipidaemias in relation to diet.
6. Glycation of proteins.

Proposals in any one of these priority fields will be given consideration. The research grants are awarded on a 2 yearly basis. Continuation of the grant for the second year of study is dependent on progress made, as assessed by the Advisory Panel from a report submitted for this purpose.

INSTRUCTIONS FOR PROPOSAL PREPARATIONS:

In order to allow for a proper evaluation of proposals by reviewers, the following items should be included:

1. One page abstract of the proposal project (200-word maximum)
2. Short description of background for proposed project research.
3. Succinct statement of project objectives.
4. Short description of methods to be used in pursuing objectives.
5. Clearance for the research from an Animal or Human Review Committee if applicable.
6. Curriculum vitae and list of full-length publications over the last six years.
7. Detailed budget (to include the proposed budget for the first and second years of study).

NOTE: No funds are provided for major equipment (unit cost greater than R2 000) or travel costs.

The deadline for proposals to be submitted is 15 November 1991. Application forms are available from and, when completed, should be returned to: The Nutritionist, The South African Sugar Association, PO Box 374, DURBAN 4000. Tel: (031) 305 6161.

Neither late applications nor applications received by facsimile will be accepted.

SUGAR ASSOCIATION



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METHODS THAT CAN BE USED FOR THE DETERMINING OF FOOD INTAKE

Mieke Faber

There are at present various methods for the measurement of the dietary intake of individuals and groups. There is no best method for all study purposes. Each method has advantages and disadvantages. In general, methods can be divided into 2 basic categories. One category records data at the time of eating. The second category collects data about the diet in the immediate, recent or distant past.¹

The selection of the method for a dietary survey depends on:

- objectives of the study, e.g. the degree of accuracy needed and the type of data needed.
- the study population, e.g. the sample size, the cooperation and ability of the subjects and the constraints on time.
- the expertise available, e.g. the skill of the interviewer.

- The resources available, e.g. finances.²

The likely response rate and the accuracy of the method is also important.³ Generally, the more accurate the method, the greater the cost, the greater the degree of respondent cooperation that is required and the lower the response rate.³

DIETARY RECORDS OF PRESENT FOOD INTAKE

In this method, the respondent keeps a record of all food and drink consumed. The portion sizes are either weighed, measured or estimated.⁴ For this method the respondents must be literate, physically able to write, and motivated to keep a detailed diary.⁵ The advantage of this method is that it does not rely on memory. It can also provide detailed food and food pattern information. It must however, be kept in mind that there is a decline in the accuracy in recording after a few consecutive days. Another disadvantage is that the fact that he must record everything that he consumes might intentionally or unintentionally influence and alter the respondent's dietary intake.⁶ For example, a respondent might choose to order a sandwich at lunch instead of choosing a

dozen or so items from a salad bar, because the former would be easier to record.⁷ The seven-day dietary record is impractical for epidemiologic studies since it demands a high degree of cooperation on the part of the subjects.⁴

The dietary record can either be a weighed record or an estimated record. When keeping a weighed record, the respondents weigh and record the food immediately before eating and after the meal the leftovers are weighed. This is thought to be the most accurate method. It requires a higher degree of cooperation from the respondents than some other methods and this is likely to affect the response.¹ With an estimated record the food eaten is recorded in household measures such as spoons and cups. It is simpler and less demanding for the respondents than the weighing method. There is less interference with usual dietary practices if the food need not to be weighed. Estimated records are potentially well suited for collecting cross-sectional data,¹ especially if it is kept in mind that the weighed method and the estimated method gave similar assessments of mean protein and energy intake.⁵

In order to classify the nutrients into the top or bottom

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thirds at 80 per cent reliability it was indicated that for sugar and carbohydrates 2 to 3 days of record keeping are long enough, whereas for dietary cholesterol and P/S ratio much longer surveys of 2 to 3 weeks are needed. For most of the other nutrients a week's survey appears to be enough.⁸ It would appear that the period for measuring habitual intake should be 7 days.⁹ In order to monitor lipid and energy intake, 7 consecutive days of food recording were considered the minimum requirement for a 95% confidence limit.¹⁰ Dietary intake indicated that a one week record was as representative as any other week during a 28-day study.¹¹ It can be questioned whether a period longer than seven days should be used since it was found that the validity of the 7-day dietary record declined during the last few days of the record period. Moreover, respondents keeping records for longer periods tend to be more motivated and better educated than those who drop out.¹² Thus, if the recording period is too long, the final sample may not be representative of the group it is intended to reflect.

RECALL OF INTAKE IN THE PAST

24-hour recall

The respondent is asked to recall his intake in the last 24 hours or for the preceding day. Food quantities are usually assessed by the use of household measures, food models or photographs. The interviewer should be trained in the art of questioning.¹ The main dis-

It should always be kept in mind that each method has its shortcomings. The method most suitable for the purpose of the study should be used.

advantages of this method is its reliance on memory,³ and the fact that due to day to day variation it can only be used for groups.¹ When using the 24-hour recall method, some respondents overestimate their usual intake and some underestimate it.⁵ This method may also be subject to the "flat slope" syndrome. This means that it may overestimate the intakes of those respondents with a low intake and underestimate the intakes of those with a high intake.¹² This could be of particular concern in athletes, as different groups of athletes may have either habitually low or high levels of food intake.⁷ The 24-hour recall has been directly validated by comparing recalled intakes with intakes that were previously observed and unobtrusively recorded by the investigators. Mean intakes estimated from these two methods were similar for the group as a whole, indicating that the 24-hour recall is valid for assessing intakes of groups.¹² The 24-hour recall is less costly and less demanding on the subject. The main advantages of this method is that it is quick and simple to perform and it places a minimal

burden on the respondent leading to a high response rate.¹ It can yield good information about the average dietary intake of a large population, but it is unsatisfactory on the individual level.^{2,13} However, it can be used to determine the nutrient intake of an individual provided that multiple recalls, spaced over a considerable time period, are obtained. The average of the multiple days may give a good indication of the individuals intake.⁶ In as early as 1952 Young *et al* has stated that when an estimate of the mean intake of large groups ($n > 50$) is desired and when some errors of 10 per cent can be tolerated, the shorter 24-hour recall method can be used in the place of the more time-consuming seven day record. This would mean a saving in time, both in collection of data and its calculation and analysis. Less participants time and co-operation is needed, resulting in the possibility of a more representative population sample.¹⁴

The 24-hour recall can be administered by interview or per telephone. When the 24-hour recall was administered per telephone, it was found that this method produced acceptable estimates of the means and distributions of nutrient intakes among groups of individuals. The telephonic 24-hour recall can markedly reduce the cost, time, logistical and personnel constraints associated with nutrition surveys.¹⁵

According to Garn *et al.* (1978) if a cut-off point is used to ascertain the percentage of subjects at nutritional risk, a

higher proportion of individuals will be classified as being at risk using a 1-day nutrient intake as compared to seven days. Although 1-day dietary intake methods may be used with confidence in determining the mean intake of a large enough sample, 1-day dietary intake methods are inappropriate in ranking individuals, or in estimating the proportion of individuals at nutritional risk.¹⁶

Diet history

This method assesses the usual intake over a period of time such as the past year. As opposed to the food frequency method, portion sizes of all the foods are given and this method determines the whole diet and not only a few nutrients.⁶ The diet history method yields higher values than the seven day record^{4,13} as well as the 24-hour recall.¹³ This method gives information on the diet over a long period of time. The main disadvantage is that it relies on the respondents memory. It also concentrates on regular patterns so that irregularities are easily underestimated.¹ It also requires that subjects be aware of their food intake and have well defined eating patterns.⁷

Food frequency questionnaires

In this method, the respondent is presented with a list of foods and asked how often he eats them.⁶ For estimating usual food intake of a group, the frequency method appears to be highly successful. This method is however, not recom-

mended to estimate the precise nutrient intake of individuals.¹⁷ This method is cheap and simple.¹

Analyzing the collected data

After the food intake has been determined, it must be converted into nutrient intake. Although this can be done by hand, this is a very cumbersome method. Nowadays, nutrient analysis is usually done by computer. For this purpose, various computer programmes are available, either for the PC or for the mainframe. Before the food can be analysed, all food consumed must be converted to grammes. There is a South African manual available that assists with the conversion of food items from household measures to grammes.¹⁸ After the food items are converted to grammes, it is analysed by computer in order to obtain the different nutrients.

In summary it can be said that when doing a dietary study, it should always be kept in mind that each method has its shortcomings. The method most suitable for the purpose of the study should be used.

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THE PHYSIOTHERAPY ASSESSMENT AND TREATMENT OF A TENNIS ELBOW

Joyce Morton

With Wimbledon only recently over, it seems an appropriate time to discuss the physiotherapy approach to a lesion of the extensors carpi radialis longus and brevis.

A tennis player will usually give a history of a typical over-use injury. As with all tenoperiosteal lesions, the older the player, the more prone he is to injury. The injury is caused by faulty stroke technique, too heavy a racquet or too tightly strung a racquet, or an incorrect size of the racquet grip. The result is that the extensor muscles of the forearm are loaded with a weight which is too heavy for them, they are unable to cope with the stress and micro-trauma takes place. As the player continues to play tennis, any attempted healing by the body breaks down and more micro-trauma takes place. Eventually the pain is so severe that the player is often no longer able to grip his racquet, let alone play a shot.

On examination, the diagnosis is confirmed by keeping the elbow extended and extending the wrist against re-

sistance. Pain is felt at the elbow, but may refer along the back of the forearm as far as the wrist and dorsum of the hand, or the pain may even refer up the arm.

There are three sites which can be the cause of the pain at the elbow, the most common being the tenoperiosteal origin on the lateral epicondyle. It is this lesion which often responds to a steroid injection and also often responds to physiotherapy techniques. At least in this case it is comforting to know that if one avenue of treatment fails, there is another avenue to follow. The physiotherapist treats the injury as follows:

After palpating for the painful area she massages the site with deep transverse frictions using her thumb. This technique divized by the late Dr James Cyriax is without doubt one of the most successful techniques that we use for soft tissue injuries. To begin with, the patient will find the massage exquisitely painful but as the minutes go by the area becomes numb. Dr Cyriax advocates that this massage is continued for 15 minutes. It is extremely tiring work for the physiotherapist and I must add that her thumb too becomes numb!

Some physiotherapists follow this by placing the arm in internal rotation, the forearm in pronation, the elbow in a few degrees of flexion and the wrist in full flexion. Keeping the wrist fully flexed, the physiotherapist snaps the elbow into full extension. This technique is called a Mills manipulation.

As only a small section of the tenoperiosteal junction is affected, the aim of the physiotherapy treatment is to pull apart the two surfaces joined by the painful scar so that the rest of the tendon may take the strain instead. After a time new fibrous tissue is laid down which is not under tension. The new scar is malleable and pain free when the patient uses his extensors. Even Mr GD Maitland, whose teachings most South African physiotherapist follow, agrees that this is the only way to treat a tennis elbow if it is a true tennis elbow. If however there is an elbow joint component and this usually occurs if the injury has been chronic, then the joint is treated using the techniques that Mr Maitland advocates and the tenoperiosteal junction is treated using the techniques advocated by Dr Cyriax.

The other two sites are

either at the body of the tendon over the head of the radius or at the origin of the extensor carpi radialis longus at the supracondylar ridge. These two sites respond to massage swiftly.

The bellies of the extensor muscles may also be injured at the level of the neck of the radius. The area is palpated by squeezing the bellies between finger and thumb, not by pressing the bellies against the radius as this is normally tender and would give a false diagnosis. Massage does not really help with this injury

but a steroid injection does.

The mistake that a player now makes is that because it is now symptom free he rushes back to tennis. The muscle has been injured, thus it is weakened. As with all muscle injuries, one does not return to sport until the muscle is strengthened. A programme of graded exercises is given starting with isometric training. As there is no movement of the joint only the muscle is being loaded. The exercise is done at each 20 degrees starting from full flexion of the elbow to full extension. Each contraction is held for 10 seconds. Pain is the guiding factor as one does not want to start the whole cycle again by causing micro-trauma. The patient progresses to lifting a very light load. A muscle's strength is built up if that muscle is exercised until it is tired. Research in the last 18 months has shown that it is the eccentric movement which is the key to strengthening. This means that the weight must be

lowered against gravity whilst using the extensors. If the player sits with his wrist extended over the edge of a table, he can extend and flex his wrist whilst holding the weight. He will then be doing both concentric and eccentric strengthening. The load is increased guided by the fact that there is no pain.

Stretching of the muscles once they are warm, must not be forgotten. The muscles run over two joints, therefore to stretch them, the elbow is extended, the wrist flexed and the forearm pronated. The stretch is held for 30 seconds and then during a further 30 seconds slightly more stretch is achieved due to the inverse stretch reflex.

When the player returns to his game, it is advisable that he wears a tennis elbow brace or a heat retainer. Heat retainers are becoming more and more popular in this country as they not only keep the area very warm but also act as a proprioceptive stimulus. □



First analgesia is produced by deep massage.



Mill's manipulation may succeed at the epicondyle should injection fail, but the procedure is valueless unless the patient's wrist is fixed in fullest flexion throughout.

SASMA NEWS/SASGV NUUS

Een van die hoofdoelstellings van die Suid-Afrikaanse Sportgeneeskunde Vereniging is om wetenskaplike navorsing op die gebied van sportgeneeskunde aan te moedig en te publiseer tot voordeel van ons lede en ander persone wat gemoeid is met die versorging en afrigting van sportlui. Ten einde ons in staat te stel om hierdie oogmerk te bereik, is daar op die vorige uitvoerende komiteevergadering van die SASGV besluit om die standaard van ons tydskrif nog verder te verhoog ten einde meer plaaslike en oorsese navorsers aan te moedig om in die joernaal te publiseer.

Die eerste stap in hierdie rigting is reeds geneem met die aanstelling van die internasionale adviserende raad wat saamgestel is uit verskeie sportwetenskaplikes wêreldwyd wat ingewillig het om jaarliks 'n bydrae te maak deur artikels aan te bied vir publikasie, asook om artikels te beoordeel vir publikasie. Die feit dat ons tydskrif goedgekeur is vir subsidie aan universiteite vir gepubliseerde navorsingsartikels is 'n belangrike motivering vir plaaslike navorsers wat verbonde is aan tersiêre navorsings- en onderrig-instellings.

We have also decided to increase the number of pages in our journal, to accommodate more lengthy articles. In the past the ever increasing escalating cost of printing and paper

was a major constraint in achieving this ideal. We hope to overcome this hurdle by increasing our Association's membership as well as subscribers to our journal. The Association is in great debt to all publishers and advertisers that have made our journal financially viable over the past few years. In turn, we believe that the increased readership of the journal will be to the benefit of the advertisers and sport in South Africa.

By attracting articles from abroad, the journal will also become an international forum for scientists to disseminate research findings more widely. South Africa has a major role to play in establishing sound principles in the medical care of our athletes, both in South Africa as well as the whole African continent. A reputable journal in this context will be instrumental in achieving our goal. Our journal is already distributed to the international advisory board, and hopefully we will attract subscribers from overseas. South Africa ranks high in the world in the field of medicine, and sports medicine is no exception. Indeed, we have something to say! Education in Sports Medicine and research in the sports sciences are already firmly established in our country, and there are indications that more universities in South Africa will establish Sports Medicine educational

programmes in the near future.

Met die verhoging van die wetenskaplike standaard van ons joernaal, beoog ons nie om ons joernaal se aantreklike voorkoms te verloor nie. Dit is ons voorneme om 'n gesonde balans te handhaaf tussen hoogs wetenskaplike en tegnologiese artikels en meer informele oorsigartikels wat verstaanbaar is vir 'n groot sektor van ons nie-mediese leserspubliek. Dus sal ek voortgaan om die joernaal in volkleur te publiseer. Die gewilde kort kolomme insake fisioterapie, voeding en farmakologie, gaan uitgebrei word om ook 'n gereelde sportfisiologie bydrae in te sluit. Hierdie waardevolle bydraes vervul 'n groot leemte in ons opvoedkundige programme wat wetenskaplike feite op verstaanbare wyse oordra aan al ons lesers. Dit word geskryf deur kundiges in die onderskeie velde, en ons is hulle baie dank verskuldig vir hierdie groot opoffering wat hulle maak om ten spyte van 'n baie druk professionele program nog 'n bydrae te maak tot die Suid-Afrikaanse Sportgeneeskunde Tydskrif.

The Editorial Board of the South African Sports Medicine Journal invites our readers and scientists in all related medical fields to submit articles to the Editor, Dr Clive Noble, Medpharm Publications, PO Box 1004, Cramerview 2060, or the Associate Editors: Prof

TD Noakes, Sports Science Centre, University of Cape Town, Medical School, Observatory 7925, or Dr DP van Velden, Department of Family Medicine, PO Box 19063, Tygerburg 7505.

We envisage that the South African Sports Medicine Association will have to play an increasingly important role in preparing our athletes to participate internationally. We also have to prepare primary care physicians to act as team doctors for travelling South African teams to important international sporting contests. Sports Medicine has become so specialized, that the days are limited for individual doctors to care for athletes without adequate sports medical training. Our athletes deserve to be cared for by competent physicians with specialized knowledge in their specific sport. Doctors also need to be trained in all aspects of doping control, and must be adequately equipped to advise athletes on the use and abuse of medicines in sport. Informed doctors will stimulate the trust of the athletes to reveal their confidential medical problems without the fear that the doctor will break confidentiality by disclosing information without their prior consent.

It is in the interest of all athletes to have access to the best possible medical care, and not to be exploited by scientists, doctors or coaches. Through our journal we wish to keep our sportsmen informed on the new developments in the Sports Medicine field to help them in a scientific way to maintain their competitive edge. □

BEST SPORTS MEDICINE GRADUATE



Post-graduate students of the new sports medicine course at the University of Cape Town

The sports arena is becoming more and more sophisticated and with this, unfortunately, sports injuries are on the increase. To keep abreast of these developments, the University of Cape Town has introduced a new post graduate course in sports medicine for medical practitioners.

Extending over two years, the new course includes regular lectures, workshops, clinical case discussions and sports medicine clinics. A comprehensive research project must also be completed.

The top student who will graduate with the newly developed post-graduate Sports Medicine degree from the University of Cape Town, will win a prestigious medal and accompanying cash prize as a result of an annual sponsorship that has been

announced by Boots Pharmaceuticals.

This announcement was made at the recent Sports Medicine Congress at Sun City with the aim of promoting continuing medical education. "We believe Sports Medicine is a growing science and of importance in South Africa due to the varied types of sports injuries that people encounter," the product manager of Froben said.

The accompanying cash prize is granted to the top student to present him/her findings at an overseas congress with the aim of gaining better exposure and knowledge of current developments.

The first students will graduate with a BSc (Med)(Hons) Sports Medicine Degree at the end of 1991. □

FEMALE ATHLETES - HEALTH RISKS

Male and female athletes generally develop similar training related injuries but despite the equality of the sexes, women are more prone to hormone and diet-related complications.

In her paper on problems of high performance female athletes presented at the IV South African Sports Medicine Association Congress in Sun City in April, guest speaker Professor Moira O'Brien of Dublin, said that a detailed record of the athlete's menstrual cycle was vital to prevent the onset of musculoskel-

etal problems.

These problems are more common in female athletes who are amenorrhic. Skeletal problems are also associated commonly with late menarche, particularly in single sided sports such as tennis and top level swimming.

Prof O'Brien who is the Director of the Human Performance Laboratory at Trinity College, said amenorrhoea should be investigated as osteoporosis could occur due to deficient oestrogen production, even in 20 year old female athletes. "If the low levels of oestrogen are untreated, it will increase the risk of fractures and osteoporosis at the menopause", she said.

Prof O'Brien suggests that female athletes who develop recurrent shin splints or stress fractures should have a biomechanical assessment as well as a full hormone profile, a dietary analysis, and bone mineral density assessed.

She pointed out that while moderate exercise protected women against osteoporosis, excessive exercise might cause the condition. Amenorrhic athletes who are hypoestrogenic develop reduced bone mass. Prof O'Brien said the mean bone density in amenorrhic runners aged 25, was comparable to that of women aged 50. "If not treated, they are guaranteed stress fractures at the menopause", she warned.

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Osteoporosis is associated with the age of onset of training, intensity and volume of training, duration of participation in training, the type of sport, diet and stress.

In his paper on osteoporosis in exercise, Witwatersrand orthopaedic registrar Dr Robert van der Plank, warned that exercise induced amenorrhoea could be fatal.

"A woman who exercises to this level loses all the protective effects of her own oestrogens and she loses bone at the same rate as a woman who has been oöpharectomised", Dr van der Plank said. Where other injuries are concerned, injuries to the ligaments of the ankle and knee joints are most common in female athletes. The most frequent injuries in high performance athletes can be attributed to overuse, doing too much too quickly, according to Prof O'Brien.

Dietary problems occur more frequently in female

athletes, particularly in the so-called feminine sports such as gymnastics and synchronised swimming.

Professor O'Brien said eating disorders occurred in 20% of athletes in sports where leanness was emphasised. In a recent English survey, 40% of synchronised swimmers were found to be below the recommended level of nutrients. Female athletes are also more likely to be iron deficient.

Editor's Note

New on the market is the Lunar DPX, a highly efficient dual photon bone densitometer. It is one of the world's most advanced scanners providing an accurate and precise measurement of bone mass which leads to the detection of osteoporosis - both early and advanced stages.

For more information, please telephone Omnimed at (011) 833-6250.

competitions may be the death knell of an athlete's career," he said.

Dr Skowno warned that with the onset of international competition and the increasing number of sportsmen turning professional, any medical blunder would not be taken lightly. Doctors who prescribe anabolic steroids to athletes can also be held liable for any serious medical side-effects as it is illegal to prescribe steroids to enhance performance.

Dr Skowno said one of the reasons for the widespread ignorance of sport drug rules was the lack of an up to date and concise list of banned or acceptable drugs in sport. Two commercial publications will be made available towards the end of the year with guidelines on drug prescribing in sport.

Besides acquiring the necessary knowledge of acceptable drugs in sport, Dr Skowno feels that the doctor should also play an active role in preventing the use of steroids and stimulants by athletes.

Dr Tim Noakes, who succeeds Dr Dawie van Velden as President of the Sports Medicine Association, said doctors, pharmacists and athletes needed to know which drugs were acceptable in sport.

"In South Africa, 50% of the athletes caught taking banned substances took the drugs out of ignorance for incidental colds and flu. These drugs are often acquired over the counter and not prescribed by a doctor," Prof Noakes said.

He also felt that doctors should discourage athletes from using drugs in sports, particularly since there was no proof that agents other than

DOPING IN SPORT - WIDESPREAD IGNORANCE AMONGST DOCTORS

Widespread ignorance about sport drug rules amongst doctors, pharmacists and athletes alike was highlighted at a major sports medicine congress and a number of legal implications for doctors who did not play by the rules were identified.

It became clear from a number of speakers at the IV South African Sports Medicine Association Congress in Sun City in April that doctors who prescribed drugs banned in

sport could face legal action if the athlete is suspended from competing after positive doping tests.

In his talk on doctors, drugs and sport, Dr Joe Skowno, medical adviser to the Iron Man Triathlon in Johannesburg, said that doctors could play an important role in ruining a top sportsman's career.

"Thoughtless prescribing for a minor illness during

steroids could enhance sporting performance.

Prof Noakes singled out the lack of a unified approach to the control of drugs in sport in South Africa as one of the key problems. He said it was currently up to the administrators of the various sports to decide how vigorously they wanted to pursue the issue.

"The uncertainty of the future structure of sporting bodies in the new South Africa makes it very difficult to draw up policies on testing for drugs. Many current structures will no longer exist and no one knows who should be talking to whom," Prof Noakes said.

Cost is another factor preventing blanket testing in South Africa. "Ideally tests for steroid abuse should be done throughout the year. This has proved to be effective in Britain, but has pushed up the cost of testing," Prof Noakes said.

SOUTHERN TRANSVAAL BRANCH OF SASMA UP AND RUNNING

Dr Joe Skowno was recently elected as the chairman of the Southern Transvaal Branch of the SASMA.

One of the objectives of the group will be to establish a roster of emergency sports care personnel in the Southern Transvaal. The branch plans to train doctors, physiotherapists, etc., to deal with any emergency that might be encountered during a sporting activity. The idea is to supple-

ment existing First Aid services currently available at most large sporting occasions, and not to replace them.

Any people interested in adding their names to the roster are please to contact Dr Skowno, PO Box 68958, Bryanston 2021.

NABUMETONE: PROVIDING EFFECTIVE, SAFE THERAPY FOR THE TREATMENT OF SPORTS INJURIES

Nabumetone is an effective, well tolerated treatment for sports injuries with comparable or better clinical trial results than it's major competitors.

Several studies have compared the efficacy and tolerance of nabumetone in this indication with those of its major competitors. A comparative study with naproxen found that nabumetone-treated patients had a better resolution of injury swelling, although there was no significant difference in overall outcome between patient groups in this study. Another comparison between these two drugs found better results in the nabumetone group in terms of anti-inflammatory action and pain relief. Comparative studies with ibuprofen have also found similar or better efficacy with nabumetone. Soluble aspirin has been found to be both less effective and less well tolerated than nabumetone in patients with

sports injuries.

In a double blind comparative study, a 2 g initial loading dose of nabumetone - followed by a 1 g at night for seven days - was compared with an 800 mg loading dose of ibuprofen - followed by a 400 mg four times daily dose for seven days.

One hundred and sixty seven patients were admitted to the study, of whom 85 patients received nabumetone and 82 patients received ibuprofen. Twelve patients withdrew from the study, eight from the nabumetone group and four in the ibuprofen group. Patient withdrawals from the nabumetone-treat group were due to lack of efficacy (1 patients), non-compliance/lost to follow-up (2 patients), and recovery prior to completion (5 patients). For the ibuprofen treated group, the withdrawals were due to lack of efficacy (1 patient), loss to follow-up (1 patient), and recovery prior to completion (2 patients). All these patients were included in the efficacy analysis and the results at their last assessment were taken as the final assessment.

Both treatment groups showed a very highly statistically significant improvement ($p > 0,001$) for all parameters at both the intermediate and final assessment points. There were no statistically significant differences between treatment groups for the change in pain, swelling or limitation of function. Nabumetone however, was found to cause less adverse reaction (3,7%) vs ibuprofen (6,7%). The most common adverse reactions recorded were

gastrointestinal side effects - 2,3% for nabumetone and 4,3% for ibuprofen.

In a review of 986 sports injury patients treated in seven centres of the UK in both open and comparative studies it was concluded that nabumetone is an appropriate choice for the treatment of sports injuries because it combines good clinical efficacy with a low incidence of side effects especially gastrointestinal reactions.

References available on request.

NEW AFRICA MERCY FLIGHT SERVICE

In response to the growing number of South Africans travelling on business or holidaying in Africa, Europ Assistance has launched a new mercy flight service called Medstar.



Munro Deysel

"Last year we handled 411 emergency repatriation cases from Africa, transporting sick and injured individuals by

charter Lear jet, and we expect the number of cases to double in the next 18 months", says Munro Deysel, GM of Europ Assistance.

Few South Africans, used to the First World medical facilities here, are aware of the lack of medical care available to them while travelling in a Third World environment, or conscious of the risk they are exposed to.

Almost all African countries suffer from a lack of foreign exchange and medical skills. Qualified doctors are few and overworked, medicine is in short supply and medical equipment is often broken or unavailable. The threat of contracting diseases like Aids is increased by the widespread re-use of disposable needles.

"Our advice to fellow South Africans who become sick or injured while travelling in Africa, is to seek repatriation back to SA as soon as possible".

The new Medstar service is available on request and operates 24 hours a day from the Johannesburg based operations room manned by qualified ICU nurses and paramedics.

The service is backed by 27 years of specialised aviation experience, specialist SA doctors on 24 hour standby, and over R2 million worth of miniaturised hi-tech aviation medical equipment.

Europ Assistance is the largest travel assistance organisation in the world, operating in 211 countries with full representation in 52 African states.

The company can be contacted on (011) 838-6311.

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Simultaneous treatment with anticoagulants and/or oral antidiabetics should be avoided unless the patient can be closely monitored. Renal function (BUN, creatinine, development of oedema, weight gain, etc.) should be monitored, when giving a NSAID to the elderly or to patients with conditions that could increase their risk of developing renal failure.

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